A demonstration of dimensional metrology systems interoperability at IMTS 2004

Demonstration venue:

With the support of the Automotive Industry Action Group (AIAG) Metrology Interoperability Project Team (MIPT) and help from dimensional metrology manufacturers, NIST is engineering a public demonstration of dimensional metrology system interface standards at the International Manufacturing Technology Show (IMTS) 2004, September 8 – 15, 2004. NIST secured a 10 m x 3 m booth at the Emerging Technology Center portion of the IMTS Show.

Booth title:

AIAG Metrology Interoperability Project Team (MIPT): Enabling metrology interoperability standards that can save you time and money

Executive summary of what will be shown at the booth:

Dimensional metrology systems manufacturers and their customers worldwide have been working, within the AIAG MIPT, to enable a variety of communications interface standards. These standards allow subsystems to talk to one another, even if they come from different vendors. Such standards will save almost everyone time and money by avoiding code rewriting and measurement errors, and by enabling best-in-class solutions and lower prices due to a more competitive environment. At this booth, the AIAG MIPT will perform a live demonstration of the utility of two interface standards, I++ DME and DML, by showcasing the live execution of the same inspection routine performed using software and coordinate measuring machines (CMMs) from a wide variety of manufacturers. Accompanying this demonstration will be a live presentation describing the cost benefits of using these standards.

Longer description of what will be shown at the booth:

Dimensional metrology systems manufacturers (both software and hardware) and their customers worldwide have been working, within the AIAG MIPT, to enable a variety of communications interface standards. These standards allow subsystems to talk to one another, even if they come from different vendors. Some appropriate standards exist for existing interfaces, and others do not. Even the standards that do exist need attention by standards groups to improve interoperability. For example, implementations of the existing DMIS (Dimensional Measuring Interface Standard) standard are often not interoperable, since there are no compliance tests for DMIS implementations. Such standards will save almost everyone time and money by avoiding measurement errors, code rewriting, data translation, and keeping up with changes in multiple interface "standards." Such standards also will enable best-in-class solutions and a more competitive environment, leading to lower prices.

At this booth, the AIAG MIPT will perform a live demonstration of the utility of two interface standards, I++ DME and DML. I++ DME is a language defining the communications at the interface between the inspection execution software and the coordinate measuring machine (CMM) controller. Several vendors have inspection software products and several vendors produce CMMs. Many of these vendors have fairly mature implementations of the I++ DME interface language, including the six software vendors and three CMM vendors that are participants in this demonstration. The participating vendors are simply a representative sample of all the companies involved in the metrology interoperability standards effort.

The DML language defines communications for the interface between inspection execution software and inspection results display software (includes statistical process control (SPC) software). DML is based on the XML standard. Many software vendors have somewhat mature implementations of DML. Most of the software vendors in this demonstration have an implementation of DML.

This demo is primarily a demonstration of DME interface interoperability using the I++ DME language. The non-trivial inspection plan is executed on a test artifact. Each of the three CMMs contains a copy of the same test artifact and the inspection plan is also identical on all of the six inspection execution software packages. The demonstration consists of a sequential execution of the same inspection plan on all eighteen possible combinations of CMM and inspection software. There is no "cheating," meaning that the software does not know which CMM it is sending commands to (with some minor and necessary exceptions), neither does each CMM know which inspection software package is sending it commands.

The National Institute of Standards and Technology (NIST) engineered this demonstration with much help from the participating vendors. NIST is also responsible for generating software test utilities. There are two sets of test utilities NIST is working on, one for I++ DME implementations and one for DML implementations. The DML test suite has not yet been released, but the I++ DME test suite has gone through several versions. The NIST I++ DME test suite is used to ensure that I++ DME implementations comply with the documented I++ DME specification. The test suite also helps vendors jump-start their own implementations by providing modular code in the form of C++ class definitions, parsing code, etc. See http://www.isd.mel.nist.gov/projects/metrology_interoperability/resources.html in order to download these resources and start your own I++ DME implementation.

Accompanying this demonstration will be a live presentation describing the cost benefits of using these standards. This live presentation will be conducted at regular intervals throughout the show. Mini-CDs are available that contain more details about the work of the AIAG MIPT and NIST.

As of August 3, 2004, here is the list of participating vendors along with their product type.

Company	**Product type**
Hexagon (Sheffield)	I++ DME compliant CMM
Wenzel	I++ DME compliant CMM
Zeiss	I++ DME compliant CMM
Hexagon (Wilcox)	I++ DME compliant inspection plan execution software
LK	I++ DME compliant inspection plan execution software
Metrologic	I++ DME compliant inspection plan execution software
Metromec	I++ DME compliant inspection plan execution software
Tecnomatix	I++ DME compliant inspection plan execution software
Zeiss	I++ DME compliant inspection plan execution software
DCS	DML compliant SPC software
Delmia	Off-line inspection plan (DMIS) generation software

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